# Neuromorphic Approach Sensitivity Cell Modeling and FPGA Implementation

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Abstract: Neuromorphic engineering takes inspiration from biology to solve engineering problems using the organizing principles of biological neural computation. This field has demonstrated success in sensor based applications (vision and audition) as well in cognition and actuators. This paper is focused on mimicking an interesting functionality of the retina that is computed by one type of Retinal Ganglion Cell (RGC). It is the early detection of approaching (expanding) dark objects. This paper presents the software and hardware logic FPGA implementation of this approach sensitivity cell. It can be used in later cognition layers as an attention mechanism. The input of this hardware modeled cell comes from an asynchronous spiking Dynamic Vision Sensor, which leads to an end-to-end event based processing system. The software model has been developed in Java, and computed with an average processing time per event of 370 ns on a NUC embedded computer. The output firing rate for an approaching object depends on the cell parameters that represent the needed number of input events to reach the firing threshold. For the hardware implementation on a Spartan6 FPGA, the processing time is reduced to 160 ns/event with the clock running at 50 MHz.

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